

Ripple

An Investigation of the World's Most Advanced High-Yield Thermonuclear Weapon Design

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President Kennedy: What about our tests? How would you summarize our tests, as far as . . . so, how would they? If they were talking about our tests would they dismiss them quite as you dismiss theirs?

Glenn Seaborg: I think that they would not be able to understand the sophistication of some of the biggest advances we have . . .

Unidentified: our most advanced idea, namely the Ripple concept, leads to an inherently clean system and maximum efficiency . . .

McGeorge Bundy: It may be worth just a moment to explain what that is. . . . Because that is probably the most important technical development in our own Dominic series.

Carl Kaysen: That's the sort of breakthrough of the Livermore laboratory.¹

White House Meeting on the Dominic Nuclear Test Series,
5 September 1962

In 1962, the United States conducted the last in a series of atmospheric nuclear test operations that began in 1945. The most important—and still most highly classified—tests were of a concept that, 60 years on, constitutes what is arguably the pinnacle of thermonuclear explosives technology: the Ripple concept devised by Lawrence Radiation Laboratory (LRL).² In all probability, the Ripple device was the most advanced full-scale fusion device ever tested, with efficiency levels an order of magnitude greater than current designs. This

1. Meeting on the Dominic Nuclear Test Series, 5 September 1962, in Tape 20, Box MTG, President's Office Files, John F. Kennedy Presidential Library (JFKL), Boston, MA.

2. The facility now known as Lawrence Livermore National Laboratory (LLNL) was founded in 1952 as the University of California Radiation Laboratory at Livermore. It was renamed the Lawrence Radiation Laboratory in 1958. This name lasted until 1971, when the laboratory was given its current name. Throughout the decades, LLNL has always been referred to in short form as "Livermore," which will be used as shorthand throughout this article.

design. The June 1964 JTF-8 Scientific Report pointed this out: “It was hoped that the United States would achieve, in two quick experiments (Ripple II and III), results exceeding the performance that has been obtained through many years with conventional designs.”⁵³ In my interview with Foster, he stated that the Ripple design was “it.” *This* was the breakthrough that Teller and Brown were anticipating in 1960.

Part III

McNamara: However, in that case we could start airdrops.

Wiesner: Well, there is a problem though, that the Ripple weapons have to be fabricated.

Unidentified: That’s right.

Wiesner: So you can’t drop them tomorrow. They are still in the laboratory, in development.

Unidentified: These were actually the earliest dates at which they could be made ready.

President Kennedy: You mean and each weapon, in other word—

Unidentified: They are being run through the laboratory right now.⁵⁴

The revelation that the Ripple II and III devices were still in development at Livermore underscores the scramble to prepare additional devices after the success of Pamlico, confirming Nuckolls’s account.

Part IV

Bundy: Mr. President, you asked the question what tests do we take now. I do not find that it’s an unacceptably long list in the context of the various ideas and possibilities and knowledge probably that we have. I agree with the Secretary [of State] that that’s [i.e., Ripple II] the proper test. I think this may be our last clear chance to do this, and I think that there’s a great deal to be said for getting in a posture in which we have clearly found out the things we need to find out, because we may have a year or a year and a half when it’s not easy to find out.

President Kennedy: You think—

Rusk: In fact, a major change in the weight-yield ratio, for example, is very important from a security point of view that [*unclear*].

Wiesner: I think you have to be careful about that because it is my understanding that this test, the Ripple II, will not put you in that position. This will

53. “Report by Commander Joint Task Force Eight,” 4 June 1964, p. L-B-1-1.

54. Meeting on the Dominic Nuclear Test Series, 5 September 1962.



Figure 1. Dominic Housatonic, Ripple II, test 2 (10.0 MT), 30 October 1962. Source: Los Alamos Scientific Laboratory.

fabricated. Shortly thereafter, a highly successful subsequent test was conducted. Performance increased two-fold over the July test.⁶⁷

The improved device weighed 7,139 pounds, measured 147.9 by 56.2 inches, yielded 9.96 megatons (reported also as 10.0 megatons), and was estimated to be 99.9 percent “clean.”⁶⁸ The predicted maximum yield is still classified, but, being a re-test, it would most likely have been no higher than the 15–16 megatons predicted for Androskoggin. The test was considered a successful step in further developing the Ripple concept. Five days later, on 3 November, a National Security Council meeting was convened in the Cabinet Room of the White House to discuss Operation Dominic and to draft a public statement announcing the conclusion of the test series.⁶⁹ AEC Chairman Seaborg recounted the meeting in his diary:

67. Velarde and Santamaría, eds., *Inertial Confinement Nuclear Fusion*, p. 13.

68. “Report by Commander Joint Task Force Eight,” 4 June 1964, pp. L-B-5-1–2.

69. On 4 November, the last test of Operation Dominic (and the last-ever U.S. atmospheric nuclear test) was a small, high-altitude shot called Tighrope.